

KYOSHO
THE FINEST RADIO CONTROL MODELS

**Lewis Eckett reviews a hot contender
for 1/10 off-road championship
honours**

SCORPION



ELECTRIC OFF-ROAD competition results this year from National BRCA meetings and other events up and down the country have revealed a new front runner in the battle for kit supremacy. The 'Scorpion' and 'Beetle' kits from *Kyosho* of Japan have received an instant and enthusiastic response from novices and experts alike throughout the UK. *Kyosho* have obviously taken their time over development of their model resulting in an individual design which is both reliable and raceworthy straight from the box.

Construction

The mainstay of any car, the chassis, is in this case comprised of two pre-drilled square alloy rails running the length of the car, which after having had all the bits bolted to them forms a rigid base from which the suspension can work effectively. The front suspension system utilises trailing arms and coil spring equipped dampers (coil-over shocks). The ends of the chassis rails at the front are angled upwards, this angled part has a single mild steel bar clamped to it upon which the alloy cast trailing arms can swing. These arms in turn have the stub axle castings bolted to the side of them although these are not fixed rigidly. The stub axle castings are designed so that as the suspension arm moves upwards they rotate. A knuckle joint is located firmly onto the mild steel beam and a link made between the top of this and the stub axle block. This link keeps the castor angle of the

front wheels at a constant setting as the suspension arm moves up and down. The coil-over shocks feature adjustable collets on the damper barrel; these when moved up or down vary the tension of the coil springs. Two alloy 'towers' are bolted to the chassis rails to which the dampers are fixed, these towers are angled backwards to give a more efficient shock action. The bottom of the damper piston is linked to the suspension arm via a ball joint.

The servo saver sits upright on an alloy platform in the centre of the chassis rails.

At the rear of the car the chassis rails are spaced with an alloy plate bolted to the underside. Two further plates on top, projecting outwards, provide the bases for the rear suspension arms to pivot from. The gearbox is also a cast aluminium item and is bolted to the alloy plate with three bolts. These bolts must be tightened fully and secured using thread lock.

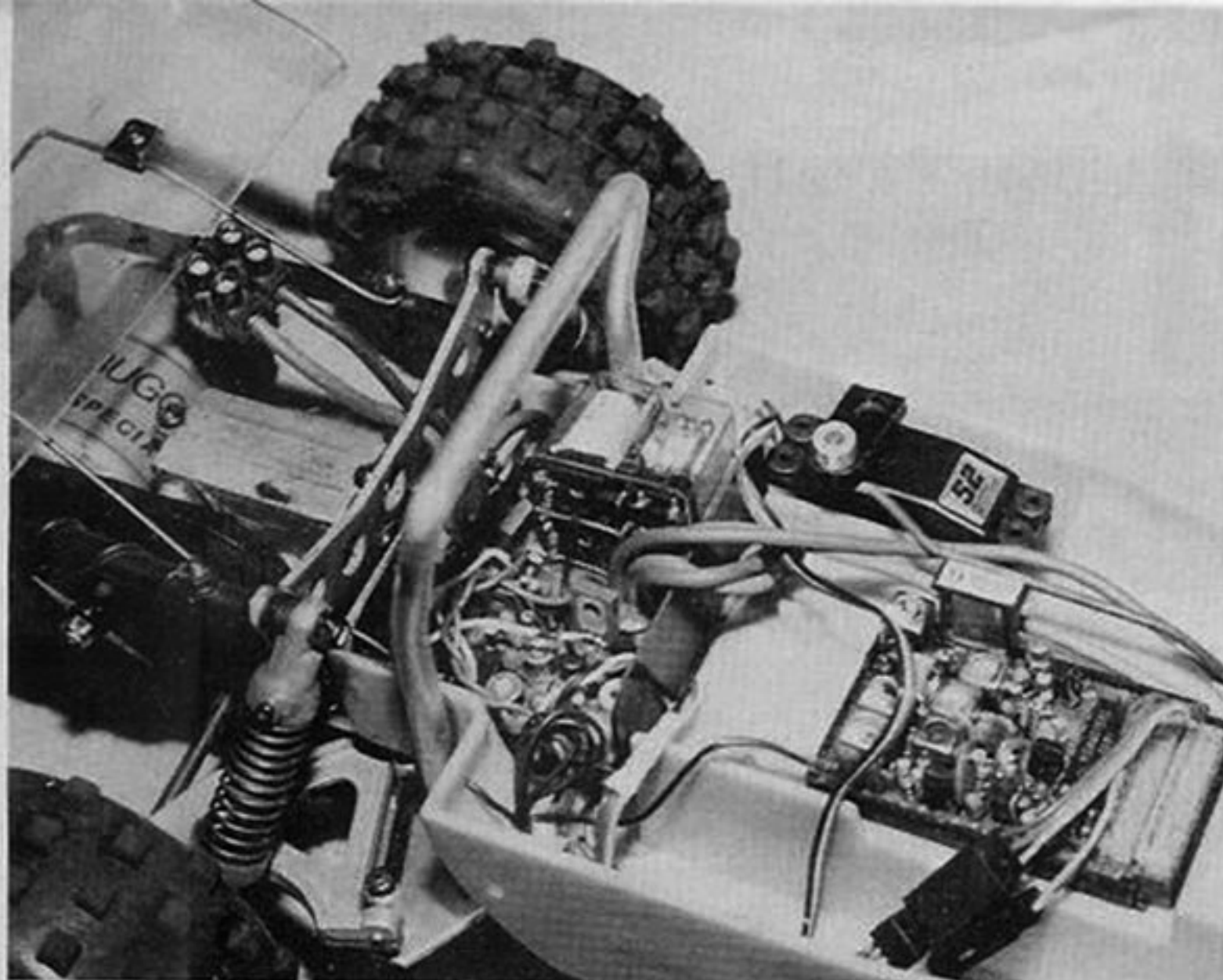
The gearbox itself is not, fortunately, one of the more classic examples of Japanese over-engineering that we have been seeing of late.

The Mabuchi 540 motor supplied in the kit is fitted to a metal motor mount which in turn is bolted to the side of the gearbox, the resulting gear train through the plastic

moulded gears is fairly efficient even though the bearings in the kit are of the bronze bush variety.

The rear suspension wishbones swing up and down on hardened steel spindles linked through two small uprights on the suspension plates. Before mounting these posts rigidly the drive shafts must be fitted between the gearbox and rear wheel hub carriers as the shafts cannot be fitted when the complete assembly is bolted up tight. On the review model a shaft on one side was found to be a slightly sloppy fit and looked in danger of 'popping' out, particularly when the suspension was moved. The solution to this was to file a slot from the inside hole of the suspension plate so that the wishbone can be moved inwards to take up the slack. The rear coil over shocks are fitted to a mounting plate bolted to the front of the gearbox and located onto the wishbones again with ball joints.

The radio crate, moulded from polypropylene or equivalent super-strong plastic, is fitted with the battery compartment sitting between the chassis rails, acting as a strengthening spacer. With the front and rear bumpers fitted it only remains to fit the wheels and tyres. Of particular note here, are the rear hubs which have a metal spacer



Above: R/C equipment layout in the Scorpion radio crate, note the perfect fit of the Laser Bug electronic controller. **Right:** front suspension really does work well, care in setting up the adjustable links pays dividends. Use very light oil in the dampers.

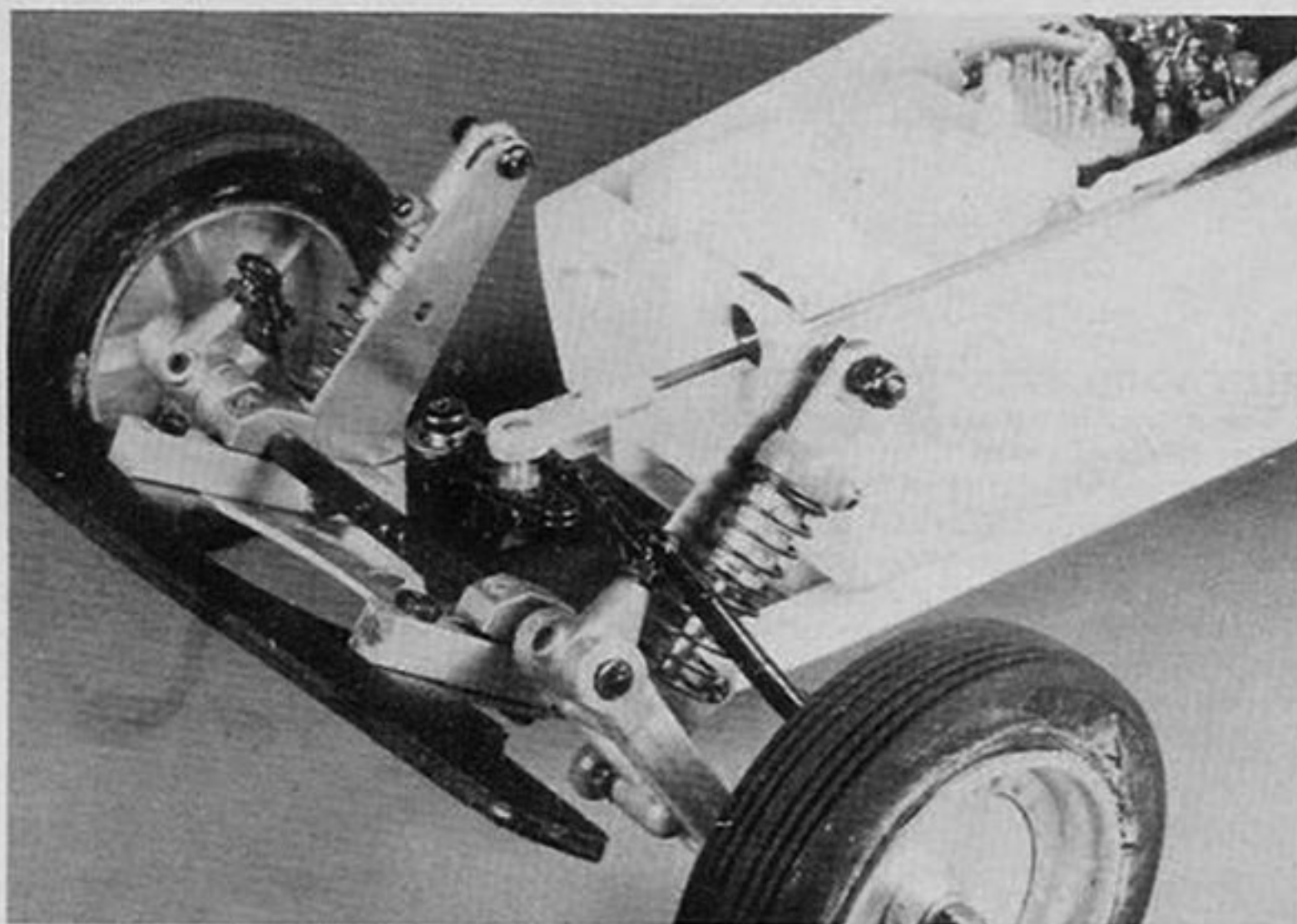
between them and the wishbone, this spacer has a very rough surface on the outer side which beds into the plastic wheel hub as the nuts are tightened up. If these nuts are not tightened fully then the rear wheels will slip as the power is applied.

Construction notes

When assembling all the cast aluminium parts it is important to remove any excess metal or rough surfaces, either with a needle file or emery cloth. Pay particular attention to the suspension pivot points so that they can move freely without binding. All the nuts and bolts should be treated with a thread locking compound to make sure that nothing shakes loose when the car is being run. Do not use cyanoacrylate (super glue) as once applied this will lock everything together permanently. Finally make sure that the chassis rails are 'square' when bolted together, the slightest tweak in the chassis will cause the car to pull to one side when running and affect the handling and suspension generally. The main reason for the chassis being crooked will be if one of the chassis rails is bent out of line, this shouldn't be the case when first building the kit, more likely to happen when you have thumped it into something hard at full speed!

Radio installation

With the 'Scorpion' kit there are no nuts and bolts to worry about as all the R/C gear is attached to the radio tray with the servo tape supplied. The steering and speed control servos are situated either side of the



compartment to keep the balance correct. Although a perfectly satisfactory speed controller is supplied in the kit, the review model was fitted out with a *Force Electronics* 'Laser Bug' speed controller for simplicity's sake. Amazingly this fitted perfectly into the space provided for the kit version. As mentioned before the six-cell Ni-Cad pack sits in a compartment slightly below the car, access to which is via a hatch situated underneath the radio tray.

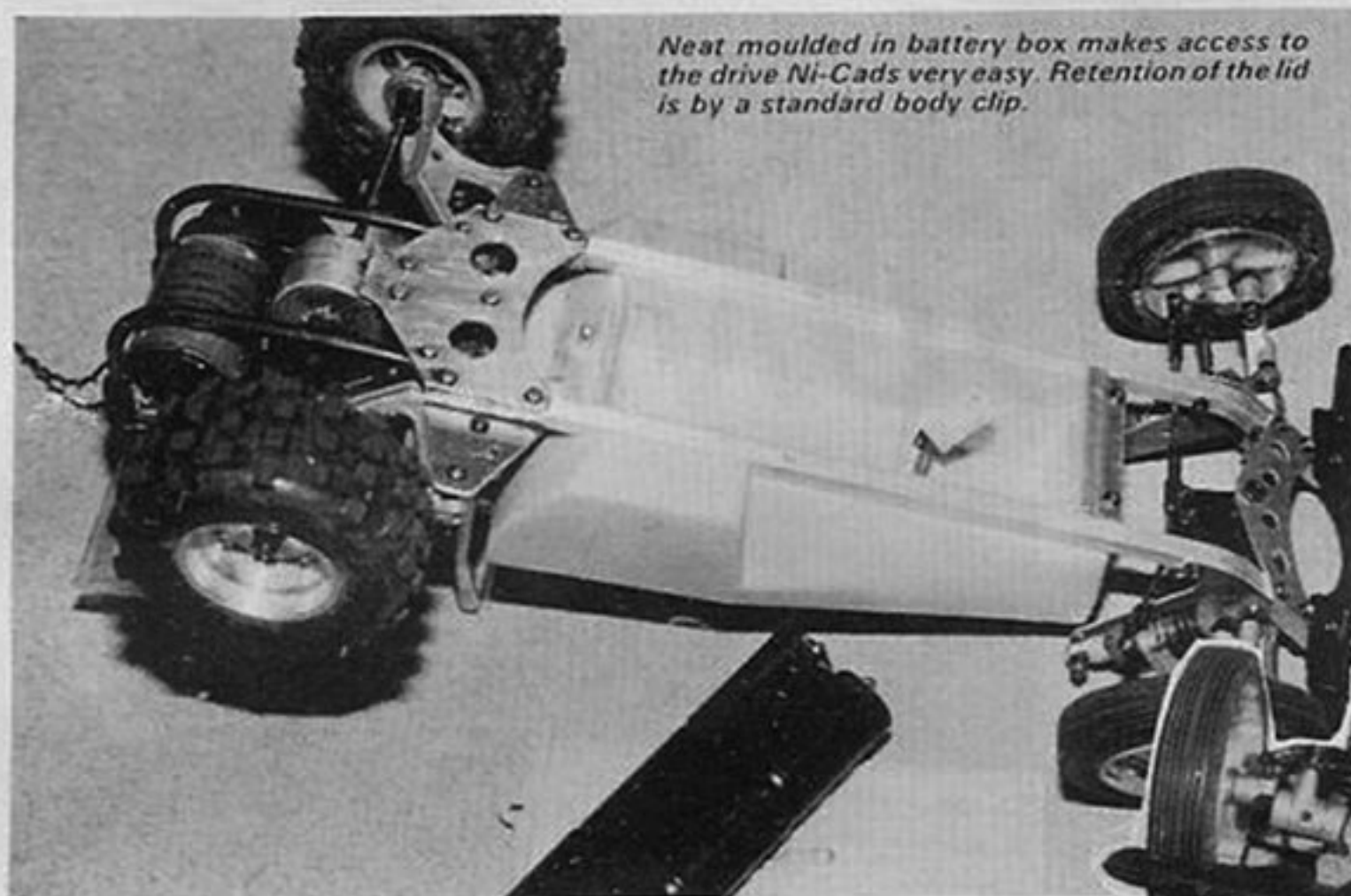
Finally all that's left to do before rushing off to the nearest bit of rough ground is to paint the bodyshell in some suitably lurid colour scheme as befitting an off-road racer. The bodyshell supplied in the kit is of the clear polycarbonate variety, complete with mounting holes and cut-outs, an airfoil wing is also supplied as is a large sheet of decals.

On the track

The office car park provided the 'Scorpion' with its first test run simply because there was no other suitable off-road course available at the time. Top speed was pretty much as expected using the kit motor and plain bearings. It certainly wasn't slow, just potentially much faster. Nevertheless this aspect took second place to the car's superb handling characteristics, the reason for this is simply the very efficient suspension (which you can actually see working as the car is moving) and the low centre of gravity due to the Ni-Cad pack placement. The car exhibited hardly any tendency to roll over when cornering at high speeds.

For its first real run in anger the car was taken to the Chingford BRCA off-road meeting. As this was proper competition racing the 'Scorpion' was further equipped with ball-races and a differential, this latter item, manufactured specifically for the 'Scorpion' by *Kyosho*, greatly improves the handling of the car on loose or rough ground and is a straight swap for the final drive gear in the

gearbox. The motor was also substituted in favour of a MG 'Buggy Special'. First runs showed that the 'Scorpion' is fully capable of transmitting all the power from the motor, through the rear wheels and onto the track, the coil springs are of just sufficient strength so as to stop the car from 'bottoming out' but still allow the suspension to soak up the humps and bumps of the course, thus keeping the wheels in contact with the ground. To be honest much of the day was spent trying to get the Ni-Cads to last long enough to acquire enough laps to qualify for a place in the final. Two gear ratios are supplied in the kit, high and low; the high gear flattened the Ni-Cads too quickly for them to last five minutes whilst low gear was too slow to complete the laps needed. Perhaps we shall see the introduction of a wider range of



ratios to suit different tracks and surfaces in the future. I hope so.

Conclusion

Possibly the best electric buggy we have tested to date, certainly the most versatile, being able to cope with most types of terrain; a definite all-rounder.

With the ball-races and MG motor fitted the performance most certainly picked up

which when combined with the differential produces a very rapid machine indeed. However all the above have to be labelled as 'go-faster-goodies' and not strictly necessary for reliable and fun racing.

The *Kyosho 'Scorpion'* is imported by *Ripmax Models Ltd.*, Ripmax Corner, Green Street, Enfield, Essex and should be available from most good model shops. Price: £70.00.



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SCORPION

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